

Maryland School Assessment

Science

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Grade 8

Acknowledgements:

A Sea Wall Just Molecule High

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New 'Time Machine' From Ice

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Session 2

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17 A student has one liter of feathers and one liter of iron nails.

Which statement best compares the masses of the two samples?

- ☐ **A** The masses cannot be compared without a balance.
- ☐ **B** The mass of the feathers is less than the mass of the nails.
- ☐ **C** The mass of the feathers is the same as the mass of the nails.
- ☐ **D** The mass of the feathers is greater than the mass of the nails.

18 Many processes on Earth occur at or near tectonic plate boundaries.

Which geological events are most common along tectonic plate boundaries?

- ☐ **A** erosion and deposition
- ☐ **B** hurricanes and tornadoes
- ☐ **C** earthquakes and volcanoes
- ☐ **D** tidal waves and sedimentation

19 A toy car rolls at a constant speed down a straight inclined track. When the car reaches the flat surface at the base of the inclined track, the speed of the car decreases.

Which statement best explains why the speed of the car decreases when it reaches the flat surface?

- ☐ **A** The force of gravity acting on the car increases.
- ☐ **B** The force of gravity acting on the car decreases.
- ☐ **C** The forces influencing the car are not balanced.
- ☐ **D** The forces influencing the car are balanced.

Directions

Use the technical passage below to answer Numbers 20 through 21.

A Sea Wall Just One Molecule High

“There was a large pond, very rough with wind. I dropped a little oil on the water. Though not more than a teaspoonful, it produced an instant calm, [making the water] as smooth as a looking glass.”

An incredible experiment, but even more so because of who performed it—Benjamin Franklin, in 1762! Aside from his political influence, Franklin was one of his day’s greatest scientists. Did the inventor of the lightning rod also discover a way to calm waves?

In a way, yes. Oil films can be extremely thin—in places, just one molecule high. So how can a barrier that shallow stop waves? One secret is in the molecules. Molecules of oil lack the bond strength found in water. Because of oil’s weaker bonds, wind can’t push it nearly as well. So oily water produces smaller waves.

In fact, you can prove this idea yourself. Set some thread on a cup of water. Instead of sinking, it floats on the surface, because water’s strong bonds form a kind of “sheet.” Then set a similar thread on a cup of oil. It sinks. Oil’s bonds are too weak.

In olden days, sailors used oil-soaked rags to calm the water around their ship. Sadly, today, the ocean is often calm where oil tankers have accidentally leaked their cargo into the sea.

Of course, making giant oil spills is not a responsible way to control ocean waves. However, researchers at the University of California at Berkeley may have discovered an amazing piece of Franklin’s puzzle. We usually think of oil as slippery. However, the whirling mist of droplets that rises off ocean waves is even slicker. Wave spray is so slick that it lets wind blow over the water until it reaches hurricane speed. And that makes the waves even bigger.

In theory, a film of oil on the water might reduce this wave spray, slowing the wind and calming the waves. There are harmless oils available that would break down naturally. The approach might not work in an actual storm, with so much water to cover. Still, it reveals some intriguing new wave science—that’s really centuries old!

- 20** Students investigated producing waves on the surface of the water in a container. The students filled four identical containers with the same amount of water. Five milliliters of oil was then added to three of the four containers. An electric fan was used to produce wind across the surface of the water in each container. The fan had four speeds; 1 was the slowest speed and 4 was the fastest.

Container	Type of Oil	Fan Speed
L	None	1
M	Canola	2
N	Corn	3
O	Olive	4

Which statement best describes an error the students made in this investigation?

- ☐ **A** The students did not use a control.
- ☐ **B** The students changed more than one variable.
- ☐ **C** The students used the same amount of water.
- ☐ **D** The students used an electric fan instead of natural wind.

- 21** Ocean tides are a possible source of renewable energy.

What device would most likely be used to convert tidal energy into electrical energy?

- ☐ **A** a turbine
- ☐ **B** an engine
- ☐ **C** a windmill
- ☐ **D** a solar cell

Use the data table below to answer Number 22.

PROPERTIES OF HYDROGEN, OXYGEN, CARBON, AND OIL

Element in Oil	State of Matter at Room Temperature	Color	Reaction with Oxygen
Hydrogen	Gas	No color	Produces energy and water
Oxygen	Gas	No color	No reaction
Carbon	Solid	Black, gray, or clear (depending on form)	Produces carbon dioxide and/or carbon monoxide
Compound	State of Matter at Room Temperature	Color	Reaction with Oxygen
Oil	Liquid	Slightly yellow to black	Produces energy, water, carbon dioxide, and/or carbon monoxide

22 Compare the properties of oil to the properties of the elements in oil. In your comparison, be sure to include

- the properties of oil
- the properties of the elements in oil
- the motion of the molecules in oil, carbon, and hydrogen

[illegible]

- 23** The motion of a car accelerating in a straight line differs from the motion of a car moving in a straight line at a constant speed.

Which change best describes acceleration of a car?

- ☐ **A** a change in the direction of the car
- ☐ **B** a change in the distance the car travels
- ☐ **C** the change in velocity divided by the time for that change
- ☐ **D** the change in the time for the car to travel a distance

- 24** When 1 gram of water is evaporated, the volume of the water vapor increases but the mass remains constant.

Why does the mass of the water remain constant?

- ☐ **A** The temperature of the water remains constant.
- ☐ **B** The pressure acting on the water remains constant.
- ☐ **C** The number of atoms in the water remains constant.
- ☐ **D** The distance between water molecules remains constant.

25 As humans grow, their bodies change.

Which of these statements explains how humans grow?

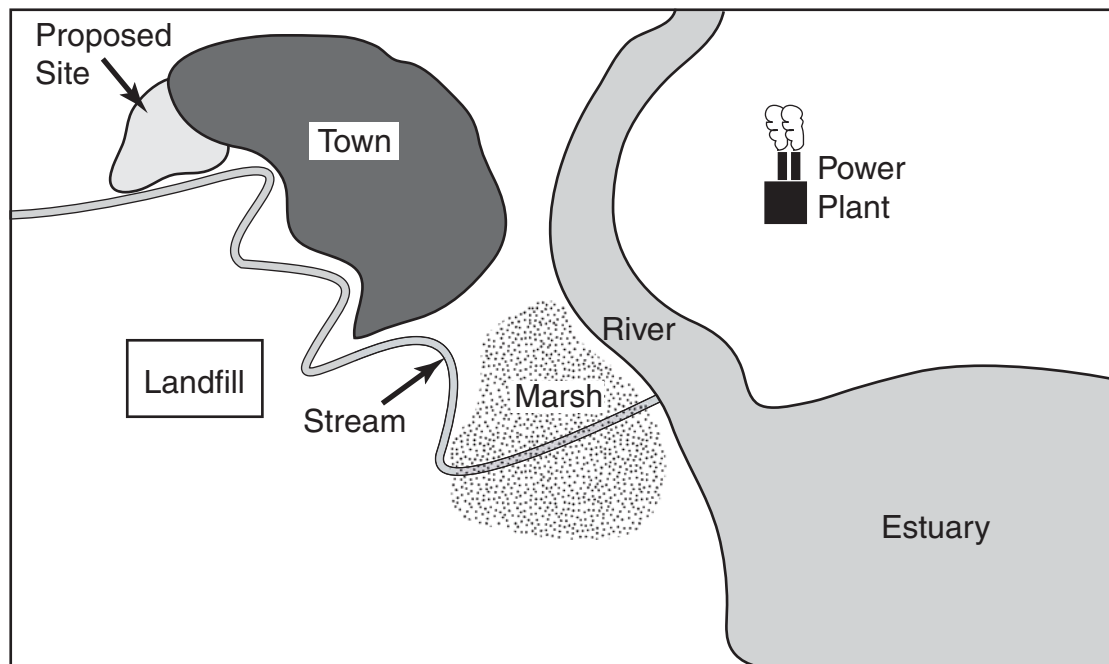
- ☐ **A** Cells form a cell wall.
- ☐ **B** Cells increase in size.
- ☐ **C** Cells undergo cell division.
- ☐ **D** Cells merge to become larger.

Directions

Use the information and the map below to answer Numbers 26 through 28.

The map shows a site for a proposed housing development near a town. A wastewater treatment plant for the housing area will be built along the stream, between the proposed development and the landfill. The stream flows through a saltwater marsh and into a river. The river empties into an estuary, similar to the Chesapeake Bay.

MAP SHOWING PROPOSED SITE FOR NEW HOUSING DEVELOPMENT



- 26** Natural processes have been eroding the stream banks near the proposed housing development site.

How will the housing development most likely affect the stream banks?

- ☐ **A** Decreased runoff from the development will increase the erosion of the stream banks.
- ☐ **B** Decreased runoff from the development will stop the erosion of the stream banks.
- ☐ **C** Increased runoff from the development will increase the erosion of the stream banks.
- ☐ **D** Increased runoff from the development will decrease the erosion of the stream banks.

- 27** Which outcome will most likely have a positive effect on the environment of the town downstream from the proposed development?

- ☐ **A** increased traffic on local roads
- ☐ **B** decreased marsh land for marsh organisms
- ☐ **C** decreased land devoted for human recreation
- ☐ **D** increased awareness of human impact on the area

28 Which of these solutions best describes how to reduce the negative environmental effects of the proposed development?

- ☐ **A** Develop wetlands to absorb chemicals in the runoff.
- ☐ **B** Plant larger lawns around houses in the development.
- ☐ **C** Build concrete drainage streams to help water flow faster.
- ☐ **D** Construct several small roads instead of a few large ones.

29 Scientists use models that show the features of an atom.

A scientist should use a model that

- ☐ **A** was the first to be developed
- ☐ **B** was most recently developed
- ☐ **C** shows the arrangement most clearly
- ☐ **D** shows the details needed for a specific purpose

- 30** As the human population grows, the demand for natural resources increases.

Which activity wastes a natural resource?

- ☐ **A** turning off lights
- ☐ **B** using public transportation
- ☐ **C** throwing away aluminum cans
- ☐ **D** opening windows to cool a house

- 31** During sexual reproduction one sperm cell unites with one egg cell to produce a fertilized egg that develops into a new organism.

Which of the following statements best describes how an offspring receives genetic information from its parents?

- ☐ **A** The offspring receives half of its genes from each parent.
- ☐ **B** The offspring receives all the genes from each parent.
- ☐ **C** The offspring receives more genes from the male parent than from the female parent.
- ☐ **D** The offspring receives more genes from the female parent than from the male parent.

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